Imaging Node

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MC Face-to-Face & Mid-Year Report
Tucson AZ
10-11 April, 2014

Data Holdings & Releases

	Q1 Release	Q2 Release	Q3 Release	Q4 Release	FY14 Volume in TB	Overall Volume in TB (end FY13)	Overall Volume in TB (end FY14)
CAS/ISS	14.8 GB (10/1/13)	13.6 GB (1/2/14)	16.0 GB (4/1/14)	10.0 GB (7/1/14)	0.1	0.5	0.6
CAS/RADAR	.2 GB (10/1/13)	.1 GB (1/2/14)	1.9 GB (4/1/14)	4.0 GB (7/1/14)	0.0	0.1	0.1
CAS/VIMS	8.2 GB (10/1/13)	7.9 GB (1/2/14)	13.7 GB (4/1/14)	4.0 GB (7/1/14)	0.0	0.17	0.2
MO/THEMIS	67.0 GB (10/1/13)	75 GB (1/2/14)	200 GB (4/1/14)	250 GB (7/1/14)	0.6	11.4	12.0
MER/Cameras	48 GB (11/14/13)	88 GB (3/7/14)	90 GB (5/23/14)	43 GB (8/23/14)	0.3	6.89	7.2
MRO/HiRISE	2.5 TB (12/2/13)	2.0 TB (3/1/14)	5.0 TB (6/1/14)	5.0 TB (9/1/14)	5.0	98.1	103.1
MRO/MARCI	35 GB (12/2/13)	50 GB (3/1/14)	70 GB (6/1/14)	70 GB (9/1/14)	0.3	1.94	2.2
MRO/CTX	86 GB (12/2/13)	148 GB (3/1/14)	200 GB (6/1/14)	200 GB (9/1/14)	0.7	6.64	7.3
MSL/Haz/NavCAM	817 GB (12/13/13)	1.2 TB (2/27/14)	500 GB (6/10/14)	500 GB (8/30/14)	3.0	1.5	4.5
MSL/MARDI	1.7 GB (12/13/13)	1.9 GB (3/5/14)	89 GB (6/10/14)	9 GB (8/30/14)	0.1	0.1	0.2
MSL/MastCAM	85 GB (12/13/13)	84.6 GB (3/5/14)	195 GB (6/10/14)	37 GB (8/30/14)	0.3	0.2	0.5
MSL/MAHLI	22 GB (12/13/13)	16.4 GB (3/5/14)	27 GB (6/10/14)	38 GB (8/30/14)	0.1	0.01	0.1
MESS/MDIS	n/a	2.0 TB (3/7/14)	n/a	500 GB (8/15/14)	2.5	1.07	3.6
LRO/LROC	24.0 TB (12/15/13)	22.0 TB (3/15/14)	25.0 TB (6/15/14)	25.0 TB (9/15/14)	96.0	381.2	477.2
LRO/LAMP	290 GB (12/15/13)	223 GB (3/15/14)	270 GB (6/15/14)	270 GB (9/15/14)	1.1	4.69	5.8
CH/M3	n/a	n/a	n/a	n/a	0.0	5.04	5.0
					110.0	**519.55**	**629.6**

Red=Future

NSSDC deliveries:

- NSSDC NAS (2x30 TB) now in-house and on LAN at IMG-USGS
- Actively interacting with NSSDC for xman s/w configuration updates
- Xman packaging and NAS population process now in progress
- Delivery of IMG accumulating data: THEMIS (~13 TB), HiRISE (~15-20TB), & considering LROC portion (~24TB)

Mission Interface – Active Missions

- **Upcoming Releases**
  - Previous slide

- **Peer Reviews**
  - **Messenger MDIS:** Completed reviews for DDRs and MD3s; reviews upcoming for high-incidence & low-incidence monochrome global maps, low-phase color map, high-resolution regional mosaics (monochrome & color)

  - **Odyssey THEMIS:** Planned new and updated products may require peer reviews

  - **MSL ECAM:** Closed final liens from EDR/RDR and Mosaic reviews

Mission Interface – Active Missions

- **Highlights**
  - **Odyssey THEMIS:** Full reprocessing planned for July 2014 (11.5 TB)
  - **MER cameras:** Continue to work with Geo on known issues (esp. mosaic volumes); OPGS/MIPL is upgrading product labels after adopting MSL's automated pipeline; Appendix will be added to the SIS and sample products distributed to users for testing
  - **Cassini RADAR:** Zebker shape model for Titan expected later in 2014
  - **Cassini ISS:** Reviewed updated Calibration Volume; volumes coiss_2075-2081 were reprocessed and released
  - **MESSENGER MDIS:** Release #11 was on time despite issues (data brick formatting, corrupted files, bad index files) that caused delays in validation; DEM data product release delayed to late 2014; Final MESSENGER data release planned for March 2016
  - **MSL Engineering Cameras:** First release of Haz, Nav mosaics (sols 1-449) validated, liens resolved
  - **MSL MAHLI, MARDI, MASTCAM (MMM):** Team will reprocess and re-release deliveries #1-5 (on a schedule being worked with IMG)
  - **MRO HiRISE:** 4.5 TB of data ingested so far in FY14
  - **LRO LROC:** 46 TB of new data archived so far in FY14. SOC has completed reprocessing of all previous data.

Mission Interface – Developing Missions

- **InSight**
  - Hosted F2F meeting with GEO and InSight project (JPL) to work schedule and deliverables, and to introduce PDS4 to the project
  - Completed Imaging Node dictionary development to support InSight camera (IDC/ICC) and Phoenix camera label and SIS development (landed camera imaging and cartographic parameters)
  - Reviewed InSight mission data dictionary and provided comments/requests to GEO
  - Participated in 2 hands-on training sessions with the AMMOS label design tool (APPS LDT) development team and InSight/MIPL staff
  - Began building sample label templates for InSight and Phoenix

Mission Interface – Restorations

- **Highlights**
  - **Apollo Metric Image Archive (ASU, USGS):** Apollo 15, 16, 17 complete (~10 TB)
  - **Apollo Rock Sample Image Archive (JSC):** Apollo 17 complete; Apollo 11, 12, 14-16 nearly complete
  - **MGS MOC RDR:** PDS-compliant dataset has been posted online as "Pre-Peer Review"
    - Peer Review to be scheduled in late spring/early summer

PDS4 Activities

- **PDS4 Development**
  - InSight-focused activities (previous slide)
  - Participated in DDWG Tiger Teams: Spectra & Geometry
  - Proposed a draft Geometry class structure with input from flight projects and NAIF (now in review by DDWG Geometry Tiger Team)
  - Participated in preparation and release of the Spectra dictionary (Nov 11, 2013) & Display dictionary (Feb 21, 2014)
  - Imaging Node dictionary initial release Nov 2013, updated development version posted Feb 2014; MGS Mission dictionary development version posted Mar 2014
  - Continued development of "Generate" tool
- **PDS4 Data Migration**
  - Continued work on Clementine UVVIS multispectral bundle
  - Completed Phoenix migration in cooperation with ATM & GEO (IMG responsible for cameras)
  - Sample PDS4 labels for MPF IMP EDR, MPF Rover movie (not archived under PDS3), MGS MOC DSDPs, GLL NIMS mosaics

PDS4 Activities

- **Staff time (WY) supporting DDWG & tiger teams**
  - Isbell (USGS): 67 hours (.06 WY)
  - Rye (JPL): 62 hours (.06 WY)

- **Staff time (WY) supporting IMG LDDs, InSight development, migration, testing & training**
  - Isbell (USGS): 325 hours (.32 WY)
  - Rye (JPL): 250 hours (.24 WY)
  - Culver (JPL): 80 hours (.08 WY)

- **Staff time (WY) supporting CCB**
  - Hare (USGS): 100 hours (0.1 WY)

Notes:

- Hours listed are for 6 months; WY calculation assumes level remains consistent for full 12 months
- Rye's funding comes from EN & IMG. Above represents all of her IMG time.

User Services

- **PDS Image Atlas II/III Development**
  - Continued development of Earth's Moon map interface to support search for Clementine, Lunar Reconnaissance Orbiter, LCROSS, and Chandrayaan-1 M3 data
  - Completed all dataset meta-data migration to SOLR index to facilitate faceted navigation
  - Received sample database from Dr. Kiri Wagstaff to discuss PDS use of landmark meta-data that is generated for Mars orbital data and how it might be used in the PDS to enable content-based searches
  - Continued design meetings with MGSS Webification developers to discuss integration of webification software with the Atlas
  - Began client web development using RESTful interface provided by SOLR JSON response capability (adds faceted navigation to the search capability)
- **Planetary Photojournal and Space Images Apps**
  - 73.6 TB of images downloaded from the Photojournal, 520 new NASA images released, and 199 M hits received (year to date). 462 images released on Space Images Apps

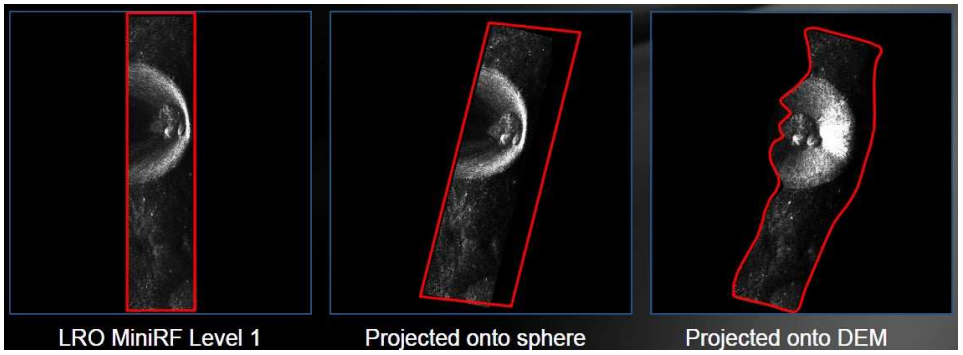
User Services

- **Projection on the Web (POW)**
  - E2E processing of PDS data to “science ready” (calibrated, map-projected) products
  - Uses ISIS camera model & software, UPC database, PILOT, cluster, GDAL
  - Pipelines are identical to missions where possible (e.g., LROC)

Supports On-Demand Processing: PDS3 to PDS4, EDR to CDR, etc.

Currently Supported Instruments in POW - Click for Instrument Notes

Cassini ISSNA
Cassini ISSWA
Clementine HIRES
Clementine NIR
Clementine UV/VIS
Galileo Orbiter SSI
Lunar Reconnaissance Orbiter LROC-NACL
Lunar Reconnaissance Orbiter LROC-NACR
Mariner 10 VID A
Mariner 10 VID B
Mars Express HRSC
Mars Global Surveyor MOC-NA
Mars Global Surveyor MOC-WA
Mars Reconnaissance Orbiter CTX
Messenger MDIS-NAC
Messenger MDIS-WAC
Odyssey THEMIS IR
Viking VIS 1A
Viking VIS 1B
Viking VIS 2A
Viking VIS 2B
Voyager NAC 1
Voyager NAC 2
Voyager WAC 1
Voyager WAC 2



- http://astrocloud.wr.usgs.gov/index.php

User Services

- **New Map-a-Planet 2 – *Beta version released for LPSC14***
  - Significant upgrade to ingestion process, metadata, layers
  - Global image mosaics, regional views, derived products, reprojection

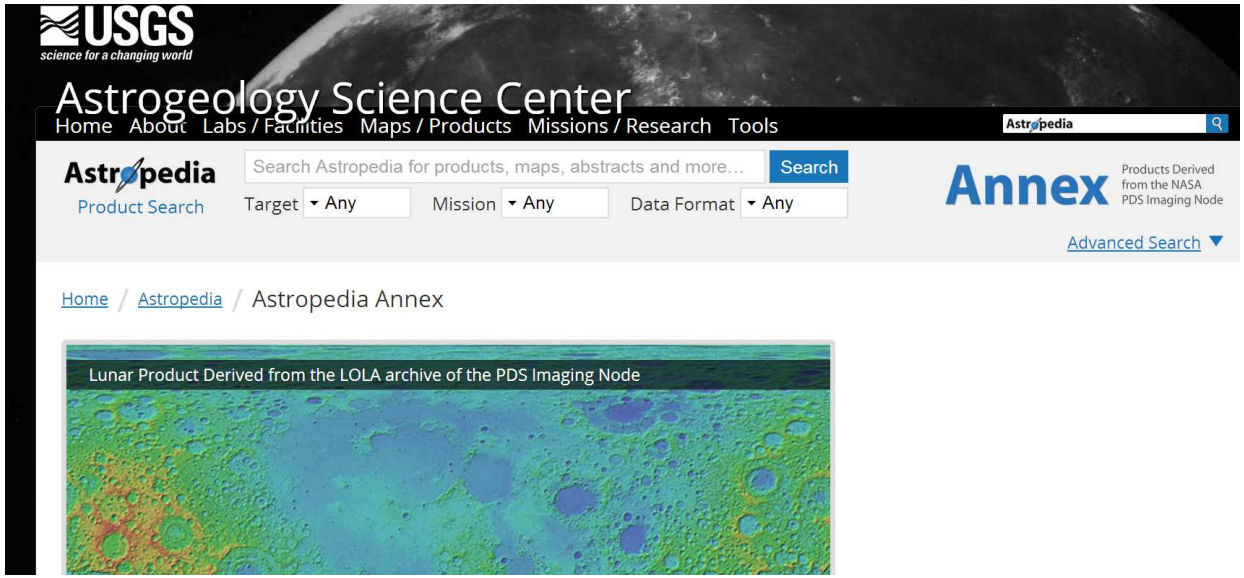
Map-a-Planet	Map-a-Planet 2
Messenger MDIS & Mariner 10 Mosaic	Messenger MDIS & Mariner 10 Mosaic 2010
	MESSENGER MDIS Global Mosaic 250m May 2013
	MESSENGER MDIS Color Global Mosaic 665m v3
SAR FMAP Left-Look	*(done - not yet staged) SAR FMAP Left-Look*
SAR FMAP Left-Look	*(done - not yet staged) SAR FMAP Right-Look*
SAR FMAP Stereo-Look	*low priority*
Magellan Global Topography Data Record (GTDR)	Magellan Global Microwave Emissivity 4641m
Magellan Global Slope Data Record (GSDR)	Magellan Global Meter Scale Slope 4641m
Magellan Global Emissivity Data Record (GEDR)	Magellan Global Microwave Emissivity 4641m
Magellan Global Reflectivity Data Record (GREDR)	Magellan Global Fresnel Reflectivity 4641m
	Magellan Global C3-MDIR Colorized Mosaic 4641m
	Magellan Global C3-MDIR Colorized Topographic Mosaic 6600m
	Magellan Global C3-MDIR Mosaic 2025m
Shaded Relief or "Hillshade" Topographic Map	*skipped*
Clementine Elevation Map	*skipped*
Clementine UVVIS 750nm Basemap V1	*skipped*
Clementine UVVIS 750nm Basemap V2	*loading*
Clementine UVVIS Multispectral Mosaic 5 band	Lunar Clementine UVVIS 5 Band Warped Image Mosaic
Clementine NIR Multispectral Mosaic 6 band	Lunar Clementine NIR Empirical Calibration 500m
	Lunar Clementine NIR Standard Calibration 500m
Clem-UVVIS Ratio Map	*loading*
Clementine Derived FeO	*Fx Function*
Clementine FeO binned color	*low priority*
Lunar Orbiter Digital Photographic Mosaic	Lunar Oribiter Digital Photographic Global Mosaic 59m
	Lunar Orbiter and Clementine UVVISv2 Hybrid Mosaic 59m
Kaguya (SELENE) Laser Altimeter: Topographic Map	*skipped*
LRO-LOLA GDR: Digital Elevation Model	LRO LOLA Elevation Model 118m (LDEM GDR)
	Lunar LOLA Color Hillshade 128ppd v04
	Lunar LOLA Hillshade 128ppd v04
	LRO LROC-WAC Global Mosaic 100m June2013
For MAP2 requested higher resolution	Kaguya TC Morning V02 Global Mosaic 474m (64ppd)
Kaguya full-res tiles are becoming downloadable	Kaguya TC Morning V04 Global Mosaic 474m (64ppd)
	Kaguya TC Evening V02 Global Mosaic 474m (64ppd)
	Kaguya TC Evening V04 Global Mosaic 474m (64ppd)
	Kaguya TC Ortho V02 Global Mosaic 474m (64ppd)
	(done - not yet staged) LRO LROC-WAC Stereo DTM 100m
	(done - not yet staged) LRO LROC-WAC Stereo Color Shade 100m
	(done - not yet staged) other misc. bases on Lunar GIS

Mars Viking Color	*low priority*
Mars Viking Color-MDIM Merge	*low priority*
Mars Viking MDIM (version 2.1)	Viking MDIM2.1 Grayscale Global Mosaic 232m
	Viking MDIM2.1 Colorized Global Mosaic 232m
Mars Viking MDIM (version 2)	*skipped*
Mars Viking MDIM (version 1)	*low priority*
Mars MGS MOLA Topography	MGS MOLA Elevation Model 463m (MEGDR)
	MGS MOLA Global Colorized Hillshade 463m
	MGS MOLA Global Grayscale Hillshade 463m
Mars MGS TES Albedo	TES Bolometric Albedo Global Map
Mars MGS TES Thermal Inertia	*loading*
	Mars Odessey THEMIS-IR Day Global Mosaic 100m v11.6
	(done - not yet staged) other misc. bases on Lunar GIS
Callisto: Galileo SSI and Voyagers 1 & 2 (gray)	Callisto Galileo/Voyager Global Mosaic 1km
Europa: Galileo SSI and Voyagers 1 & 2 (gray)	Europa Voyager and Galileo SSI Global Mosaic 500m
Ganymede: Galileo SSI and Voyagers 1 & 2 (color)	Ganymede Voyager and Galileo Color Global Mosaic 1.4km
Ganymede: Galileo SSI and Voyagers 1 & 2 (gray)	Ganymede Voyager and Galileo SSI Global Mosaic 1km
Io: Galileo Solid State Imaging (SSI) (gray)	Io Galileo SSI Grayscale Global Mosaic 1km
	Io Galileo SSI / Voyager Color Merged Global Mosaic 1km
	Io Galileo SSI Color Merged Global Mosaic 1km
	Io Galileo SSI False Color Global Mosaic 1km
	Io Galileo SSI / Voyager Global Mosaic 1km
Rhea: Voyager 1 & 2 (gray)	*loading*
Rhea: Cassini & Voyager (gray)	*loading*
Dione: Voyager 1 & 2 (airbrush)	Dione Voyager Airbrush Mosaic 610m
Dione: Cassini & Voyager (gray)	Dione Cassini and Voyager Global Mosaic 154m
Tethys: Voyager 1 & 2 (gray)	*loading*
Tethys: Cassini (gray)	*loading*
Iapetus: Voyager 1 & 2 (airbrush)	Iapetus Voyager Airbrush Global Mosaic 783m
Iapetus: Cassini & Voyager (gray)	Iapetus Cassini and Voyager Global Mosaic 783m
Enceladus: (airbrush)	Enceladus Voyager Airbrush Mosaic 273m
Enceladus: Cassini (gray)	Enceladus Cassini Global Mosaic 110m
	Titan Cassini Global Controlled ISS Global Mosaic
	(done - not yet staged) DLR Global Mosaic
	(done - not yet staged) DLR Color Shade

http://astrogeology.usgs.gov/tools/map

User Services

- **Annex**
  - Supports geospatial data products derived from existing data in PDS archive
  - MAP2 interface and improved metadata used to prototype interface for **user-submitted data products**
  - Forms-based submission of metadata, products and documentation subject to PDS reviews
  - ***Examples:*** Lunar geologic maps, Titan channels map, LOLA derived shaded-relief maps



See also Gaddis et al., 2012 (PDW), Hare et al., 2013 & 2014 (LPSC)

- http://astrogeology.usgs.gov/astropedia/annex

Security

- **Disaster Recovery Plans**
  - Existing plans now in review for USGS, JPL, THEMIS, HiRISE and LROC data nodes
  - USGS is a backup for JPL; JPL is a backup for USGS
- **IT security**
  - ***USGS:*** IT systems are protected by multiple layers of DOI network security appliances and firewalls. Local systems firewalled and configured to meet or exceed NIST security standards to preserve the integrity of data and services.
  - ***JPL:*** IT Security Team requires an IT Security Plan for each 'project', runs frequent security scans against all systems on the network, controls access as appropriate, and removes systems from the network as needed. All systems are protected by network security appliances and firewalls.
- **WAN upgrade at USGS**
  - Microwave system with dedicated 90 Mbps line for PDS servers
  - Expected to be operational by June 1, 2014

Outreach

- **LPSC 2014**
  - 5 PDS-related abstracts and presentations
- **Tools and tutorials**
  - Slideshow on LROC CDR generation in ISIS added Jan 2014
  - User guide for working with Kaguya Multiband Imager data using new ISIS camera model now in development (PGG)
  - User guide for working with Kaguya Spectral Profiler data with new ISIS ingestion script now in development (PGG)
  - Moon Mineralogy Mapper (M3) user guides for working with new ISIS ingestion and camera model now in development (LASER)
  - Testing of Python s/w for CRISM product generation to begin in summer (LASER)
  - Testing of Python "Spectral Viewer" (works with multi- and hyper-spectral data such as M3) now underway (LASER)
    - Includes creation of derived (closely held by team) products such as Integrated Band Depth for M3
- **Facebook**
  - 104 friends; frequent updates on news, data releases, etc.

2nd Planetary Data Workshop

- Planned for Flagstaff, July 28 to 31, 2014
- Facility still TBD
- USGS “procurement” process for facility remains an impediment
- ***Delay meeting to 2015?***

- 2012 meeting report (USGS Open-File Report) now available:
  - http://pubs.usgs.gov/of/2014/1056/

- http://astrogeology.usgs.gov/groups/Planetary-Data-Workshop

Next 5 Years: 2015-2019

- **Archive growth remains significant**
  - Nearly 110 TB/year – LROC is primary driver
  - Major continual effort required for management of hardware & data
- **Challenges for PDS4**
  - Significant PDS-related work is added to ongoing tasks
  - Detailed discipline and mission portions of the PDS4 model need significant work (e.g., cartography/map projection, calibration)
  - Need a plan and schedule for node initiatives and collaboration
  - Difficult to support users of both PDS3 and PDS4 data and services
  - ~25% of IMG data may be subject to manipulation for PDS4 compliance
    - High risk in manipulating the archived data to conform to PDS4 standards
    - Need policies and/or waivers, and PDS4 must be designed to handle such 'legacy' data so as not to disrupt ongoing missions (e.g., Cassini) & research
- **Tools for data providers & nodes**
  - "Generate" tool maintained and modified as needed by IMG
  - Need tools for standardized metrics reporting
  - Need training in PDS4 for data providers, PDS MI folks, etc.